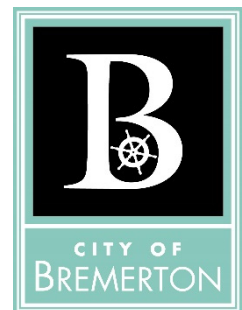


Alternatives Analysis for Decommissioning of Manette Beach Sewer from OF-4 to EB-2

Prepared for



October 2018

Prepared by

Parametrix

Alternatives Analysis for Decommissioning of Manette Beach Sewer from OF-4 to EB-2

Prepared for

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CITATION

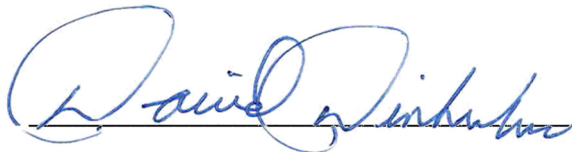
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CERTIFICATION

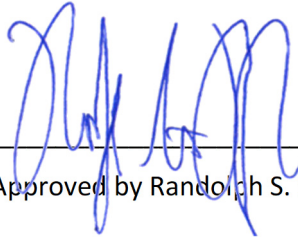
The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.



Prepared by Cedar I. Simmons, P.E.



Checked by David L. Dinkuhn, P.E.



Approved by Randolph S. Raymond, P.E.

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KEY TERMS

| | |
|------|---------------------------|
| CCTV | Closed-circuit television |
| City | City of Bremerton |
| CSO | combined sewer overflow |
| EB-2 | Sewage Pump Station EB-2 |
| HDPE | high-density polyethylene |
| I/I | Infiltration and Inflow |
| LPS | low-pressure sewer |
| OF-4 | Overflow Structure 4 |
| SSO | sanitary sewer overflow |

1. INTRODUCTION

1.1 Background

This alternatives analysis is for the capital improvement project *Sewer Conveyance Improvement C-6: Abandon Beach Sewer North of Manette Bridge* as identified in the City of Bremerton's Wastewater Comprehensive Plan Update prepared by HDR in December 2014. In general, this capital improvement project proposes to decommission the existing gravity beach main, install a package pump station at the end of East 16th Street, and install grinder pump stations for the residences tributary to the gravity beach main with discharge to Marlow Avenue and Wheaton Way. Also, included within the proposed project is elimination of Overflow Structure 4 (OF-4). Exhibit A, shown on the following page, is the Trenton Avenue Basin Plan excerpted from the City's 2014 *Wastewater Comprehensive Plan Update* by HDR (December 2014). The Exhibit shows the project location, labelled "C-6."

The section of the gravity beach main in the Manette area to be decommissioned is located between the OF-4 and Sewage Pump Station EB-2 (EB-2) and is part of the Trenton Avenue Basin. The main consists of approximately 1,840 feet of 8-inch cast-iron pipe installed in 1972 and 60 feet of high-density polyethylene (HDPE) pipe installed in 2011. There are currently thirteen apartment complexes, one duplex, and seven single family dwellings that discharge via laterals to the existing beach main. These existing services will be abandoned, and each will be replaced with a new service.

1.2 Project Motivation and Need

The key reasons the City of Bremerton (City) proposes this capital improvement project are as follows:

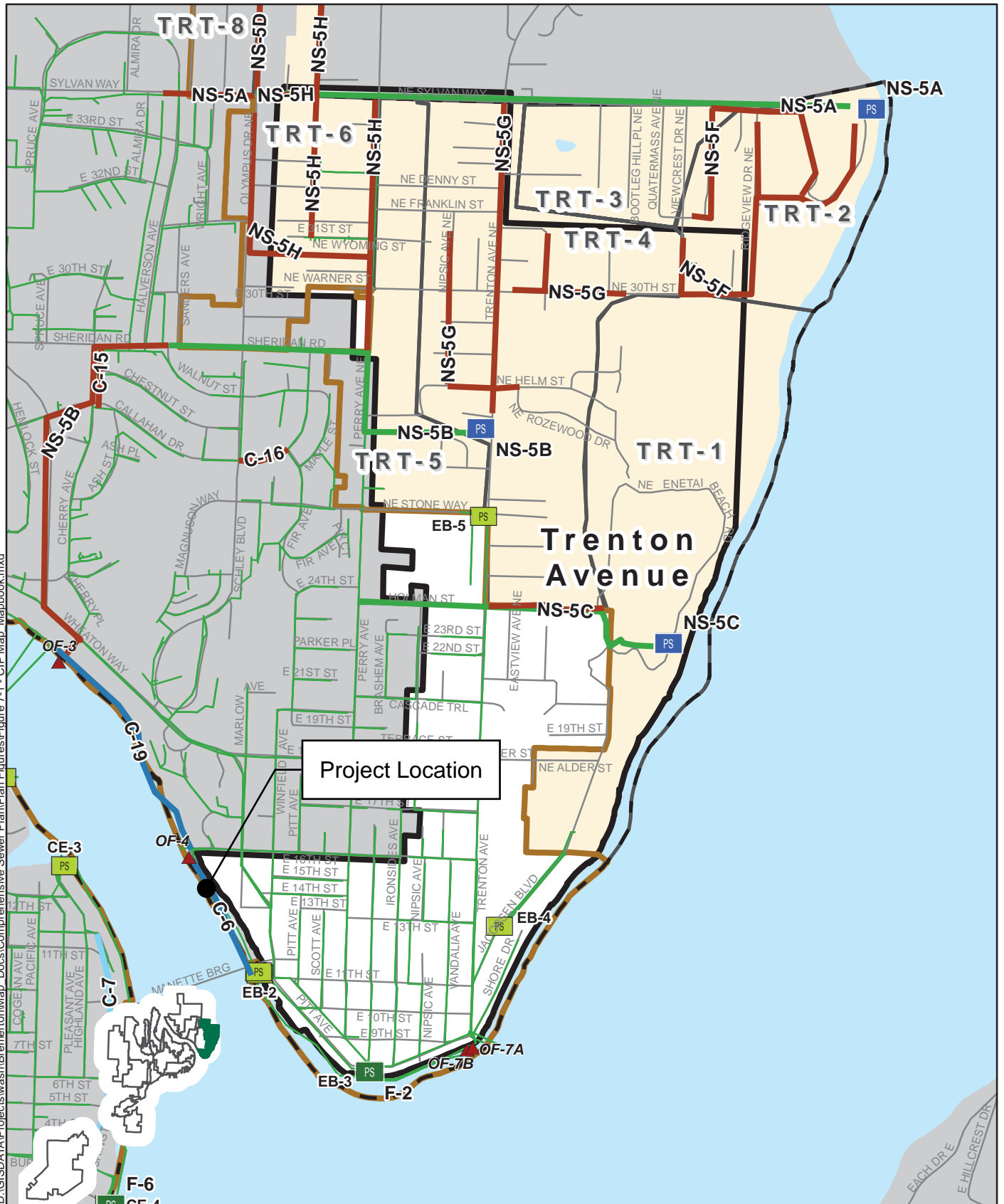
1. The beach main is difficult to access because the manhole lids are submerged at higher tides. If there is a pipe or manhole failure, City staff need to wait for access until the submerged pipe or manhole is exposed. Once the manholes are exposed, the work-window lasts only a few hours during low tide window before the line is re-submerged.
2. This section of beach main is at the end of its design life and failure of the main has the potential to flood the residences it serves.
3. Closed-circuit television (CCTV) inspection of the gravity main has revealed extensive scaling and rust build-up which greatly decreases the available flow area and thus pipe capacity.
4. Low scour velocities and bellies are known to exist in the section of main nearest the pump station, which increases the likelihood of a plugged main.

1.3 Project Objectives

The City would achieve the following objectives by abandoning the existing beach main:

1. Eliminate inaccessible wastewater infrastructure serving residents of the Trenton Avenue Basin between OF-4 and EB-2.
2. Improve water quality of the Puget Sound by reducing combined sewer overflow (CSO) and sanitary sewer overflow (SSO) events caused by failed or plugged infrastructure.
3. Reduce Infiltration and Inflow (I/I) and saltwater intrusion potential by eliminating the defunct beach main and its service laterals.

D:\GISDATA\Projects\wash\BremertonMap_Docs\Comprehensive Sewer Plan\Plan Figures\Figure 7-1 - CIP Map Mapbook.mxd



Legend

| | | |
|---------------------------|--------------------------|-------------------|
| Odor Control Upgrade | Beach Sewer | Lift Station |
| MBR | Force Main | Sewer Mains |
| PS New Pump Station | Gravity Sewer | Streets |
| PS Pump Station Upgrade | Low Pressure Sewer | Highway |
| PS Reclaimed Pump Station | Outfall | New Service Area |
| | Reclaimed Main | City of Bremerton |
| | Force Main Less Than 24" | Bremerton UGA |
| | CSO Outfall | |

Basin Trenton Avenue

Exhibit A

BASIN PLAN

City of Bremerton

1 inch = 1,430 feet

0 450 900 1,350 Feet

2. ALTERNATIVES

Based on discussions with City staff, several alternatives were identified and evaluated. Alternatives were developed for parcels both north and south of 16th Street. These alternatives are identified and described in further detail below.

Main replacement-in-kind and cleaning/lining of the existing beach main were considered prior to evaluating the below alternatives; however, these options were eliminated outright because they did not meet any of the stated project objectives.

2.1 North of 16th Street

North of 16th Street there are eight, 8-unit apartment complexes; one, 4-unit apartment complex; and two, single-family dwellings that discharge to the existing gravity beach main. Three alternative configurations were evaluated and are described below. Reference Appendices A and B for corresponding site plans and cost opinions for each alternative.

- **Alternative N-1: Eleven Grinder Stations – Nine to Parkside Drive and Two to 16th Street and Wheaton Way**

Alternative N-1 (Appendix A, Figure 1) proposes to install eleven new grinder pump stations and a low-pressure sewer (LPS) for discharge to the existing upland gravity mains. The grinder stations for the eight 8-unit apartment complexes and the one 4-unit complex would discharge to an existing City-owned LPS installed in Parkside Drive. The LPS would discharge towards the west to an existing manhole in Parkside Drive. Individual grinder stations would also be installed for the remaining two single-family dwellings, with a new City-owned LPS installed in 16th Street for discharge at an existing manhole at the intersection of 16th Street and Wheaton Way.

The main advantage of this alternative is the elimination of this discharge directly to an existing beach main. Key disadvantages include the disruption to private property required to install individual grinder stations on each parcel, as well as the development and execution of individual sewer agreements with private property owners. This alternative also has the disadvantage of a connection at Wheaton Way, which would require temporary traffic control and disrupt normal traffic flow during construction.

- **Alternative N-2 – Eleven Grinder Stations to 16th Street and OF-4**

Alternative N-2 (Appendix A, Figure 2) proposes to install eleven new grinder stations in the same configuration as described for N-1, except the connection at Wheaton Way would not be required since all the discharge would be to the existing 16-inch pipe at OF-4. Though very similar to Alternative N-1, the key advantage is that disruptive traffic control at Wheaton Way would not be required.

- **Alternative N-3 – New Package Pump Station on 16th Street with Discharge to 16-inch Beach Main**

The third alternative (Appendix A, Figure 3) evaluated for parcels north of 16th Street eliminates the need for any individual grinder stations. Instead, OF-4 located near the west end of 16th Street would be re-purposed to house two new pumps. The force main for the new pump station would discharge to the existing 16-inch beach main.

This alternative has several key advantages. Because existing gravity sewer on Parkside Drive is being reused, individual grinder stations are not required; therefore, disruption to private property owners has been eliminated as well as the need for the City to obtain and execute individual sewer agreements. Also, no disruption for a sewer connection at Wheaton Way would be required. Finally, the location of the new pump station and force-main connection at the west end of 16th Street (a dead-end street) is more conducive to construction due to minimal traffic disturbance.

2.2 South of 16th Street

To the south of 16th Street there are five apartment complexes, one duplex, and five single-family dwellings that discharge to the existing gravity beach main. Two alternative configurations were evaluated in this area. Following are descriptions of the proposed improvements for each alternative. Corresponding site plans and project cost opinions are included in Appendices A and B, respectively.

- **Alternative S-1: Eight Grinder Stations – One to 16th Street and Seven to Wheaton Way (four connections)**

Alternative S-1 (Appendix A, Figure 4) consists of eight new grinder stations. One grinder station that would serve an apartment complex would discharge to OF-4 on 16th Street and enter the existing 16-inch beach main. Four of the eight grinder stations would discharge to a new City-owned low-pressure sewer installed in Marlow Avenue and 13th Street with ultimate discharge to the existing upland gravity sewer at the intersection of 13th Street and Wheaton Way. The remaining three grinder pump stations would discharge directly to the existing Wheaton Way upland gravity sewer line.

This alternative successfully eliminates the need for the existing gravity beach main between EB-2 and OF-4, as well as minimizes the number of individual grinder stations needed by combining several parcels to be served by a single grinder station. Disadvantages include potentially significant disruption to traffic flow on Wheaton Way towards the Manette Bridge, including costs associated with sidewalk and road restoration. Additionally, complex sewer agreements and associated access easements would be required in several cases.

- **Alternative S-2: Eleven Grinder Stations – One to 16th Street and Ten to Wheaton Way (two connections)**

The second alternative evaluated for these parcels proposes 11 new grinder pump stations (Appendix A, Figure 5). As with alternative S-1, one grinder station serving an existing apartment complex would discharge to OF-4 at 16th Street. Seven of the 11 grinder stations would discharge to a new City-owned low-pressure sewer installed in Marlow Avenue, ultimately discharging to an existing manhole within the Wheaton Way right-of-way north of Marlow Avenue. The remaining three grinder stations would discharge to a new manhole located on Wheaton Way north of the Wheaton Way/Manette Bridge roundabout. The new manhole would be located within the Wheaton Way right-of-way but out of the travel path to minimize the need for temporary traffic control and disruption during construction. Connection from the new manhole to an existing manhole in Wheaton Way would be required.

Alternative S-2 has many advantages over alternative S-1. First, disruption to Wheaton Way is minimized by proposing only two new connections. This has the added effect of reducing

right-of-way restoration costs. Second, this alternative provides clear delineation of ownership and maintenance responsibility for the low-pressure sewer lines. Each individual parcel would have their own grinder pump discharge line located on the parcel that would connect to a City-owned low-pressure sewer within City right-of-way. This configuration minimizes the complexity of required sewer agreements and corresponding access easements.

3. OTHER CONSIDERATIONS

3.1 Existing Beach Main from OF-4 to EB-2

The section of existing gravity beach main to be eliminated from the collection system is approximately 1,800-feet long and runs parallel to the beach between OF-4 and EB-2. Most of the pipe is 8-inch cast iron installed in 1972. There are five manholes within this section of gravity main and 12 service laterals. One of the manholes has a second gravity main inlet which enters the manhole from the east. The size of this main is unknown. City GIS data indicates there are four services connected to this secondary main. Running parallel to the existing beach main is the EB-2 force main, an 18-inch HDPE pipe that discharges to the 16-inch gravity beach main west of 16th Street. The gravity beach main has two crossings: one with the 18-inch HDPE force main and the second with an existing 24-inch concrete stormwater outfall.

A cost opinion for removing 1,800 feet of gravity beach main, five manholes, and 12 service laterals has been developed and is provided in Appendix B. Due to access difficulties, the work to remove this infrastructure is considered cost-prohibitive and is not recommended. Further, the process of removing the pipe and associated structures would be quite destructive to the intertidal marine habitat. Instead, it is recommended to decommission the pipe and structures in place. The pipe would be plugged at the manholes and the manholes would be removed to a depth of 3 feet below grade, filled with gravel and left in place. Service laterals would be cut and plugged as well. This approach to decommissioning the main would require much less short- and long-term disruption to the environment and the residents in the area. A cost opinion for decommissioning the existing gravity sewer is also provided in Appendix B.

4. COST OPINION SUMMARY AND RECOMMENDATION

As previously described, cost opinions for each alternative have been prepared and are provided in detail in Appendix B. A summary of the preferred alternatives for “North of 16th Street” and “South of 16th Street” are presented in Table 1. The table also includes cost opinions for the beach main considerations as described in the previous section. Option 1 in Table 1 includes alternatives N-3, S-2, and the decommissioning of the existing beach main; Option 2 includes alternatives N-3, S-2, and removal of the existing beach main. Overall, based on the key advantages described for Alternatives N-3 and S-2 and the access difficulties, significant environmental impact, and is cost-prohibitive nature of complete beach main removal, Option 1 is recommended as the future course of action.

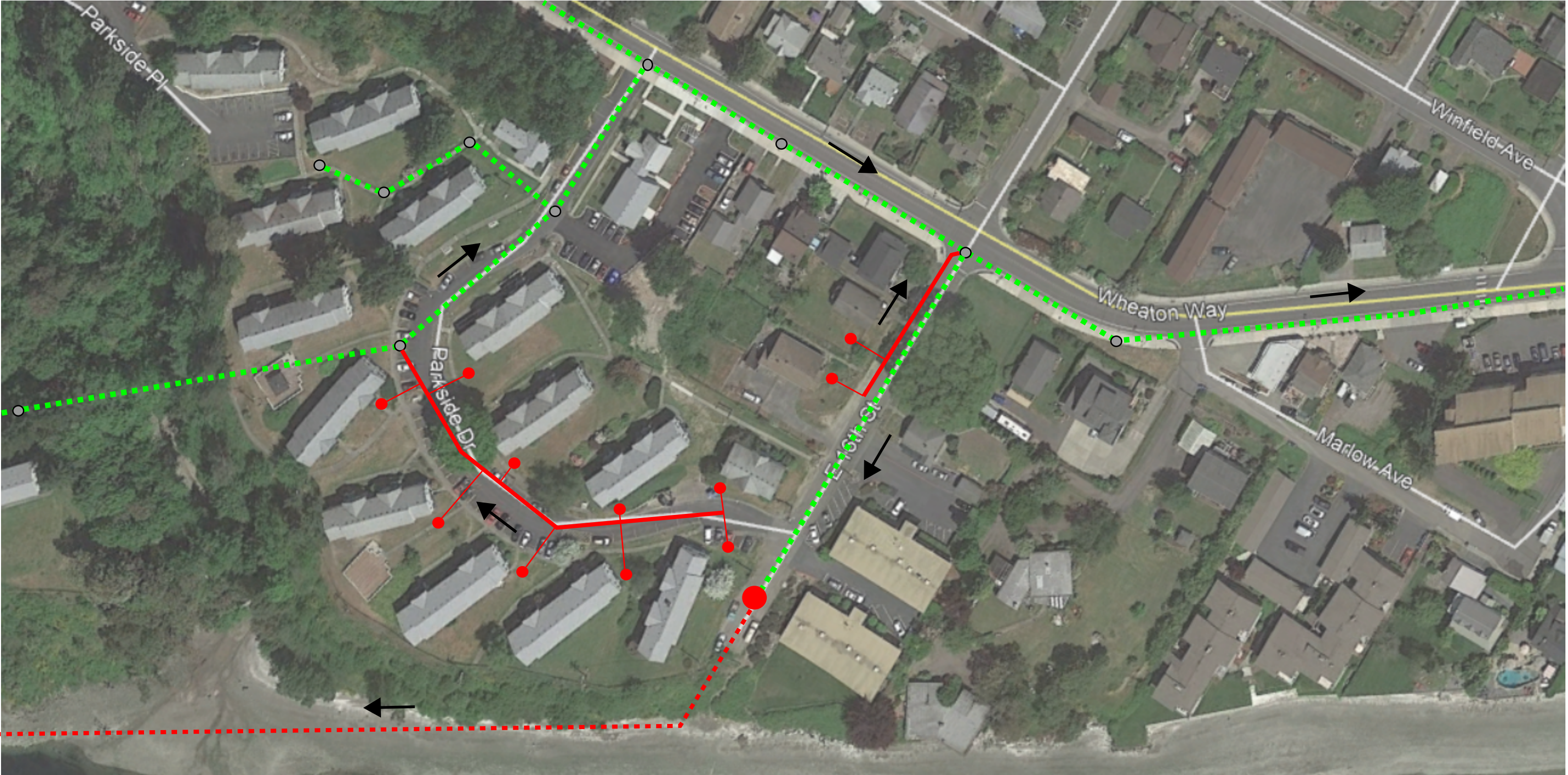
**Table 1. Total Project Cost Opinions for Recommended Alternatives N-3 and S-2,
 Including Both Beach Main Sewer Alternatives**

| Alternative | Engineer's Opinion of Probable Project Cost |
|---|---|
| Option 1 | |
| N-3 | \$661,600 |
| S-2 | \$1,136,000 |
| Decommission-In-Place Existing Beach Main | <u>\$111,100</u> |
| Option 1 Total: | \$1,908,700 |
| Option 2 | |
| N-3 | \$661,600 |
| S-2 | \$1,136,000 |
| Removal of Existing Beach Main | <u>\$525,600</u> |
| Option 2 Total: | \$2,323,200 |

Appendix A

Figures

- Figure 1 – Alternative N-1 Site Plan
- Figure 2 – Alternative N-2 Site Plan
- Figure 3 – Alternative N-3 Site Plan
- Figure 4 – Alternative S-1 Site Plan
- Figure 5 – Alternative S-2 Site Plan



| LEGEND | EXISTING | NEW |
|----------------------------|----------|-----|
| SS GRAVITY MAIN | | |
| SS GRAVITY LATERAL | | |
| LOW PRESSURE SEWER MAIN | | |
| LOW PRESSURE SEWER LATERAL | | |
| GRINDER PUMP STATION | | |
| OVERFLOW STRUCTURE 4 | | |
| SS MANHOLE | | |

DIRECTION OF FLOW ARROW

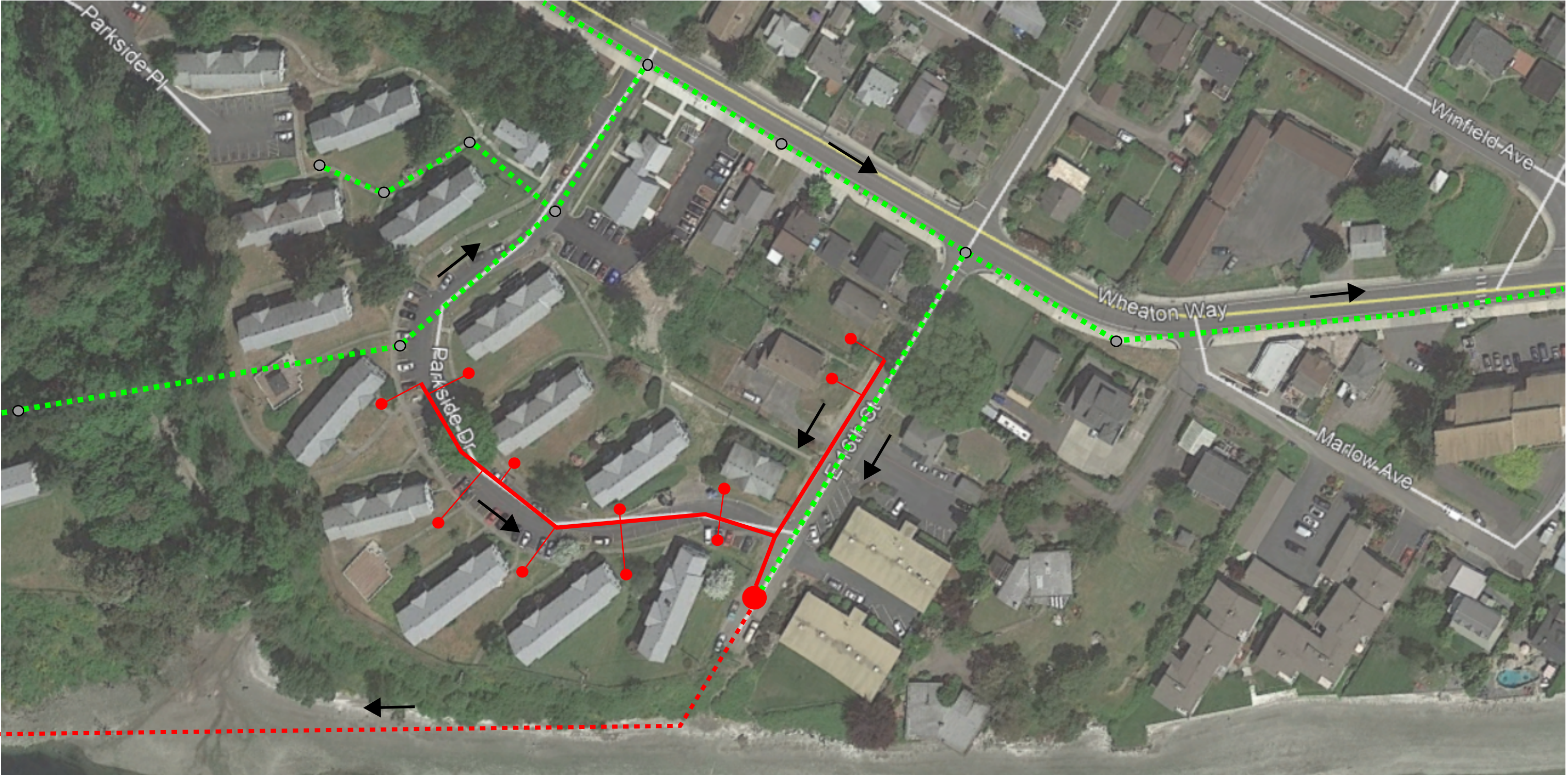
Parametrix



Not to Scale

Manette Beach Sewer Project

Figure 1 - Alternative N-1 Site Plan



LEGEND

SS GRAVITY MAIN

EXISTING

NEW

SS GRAVITY LATERAL

LOW PRESSURE SEWER MAIN

LOW PRESSURE SEWER LATERAL

GRINDER PUMP STATION

OVERFLOW STRUCTURE 4

SS MANHOLE



DIRECTION OF FLOW ARROW

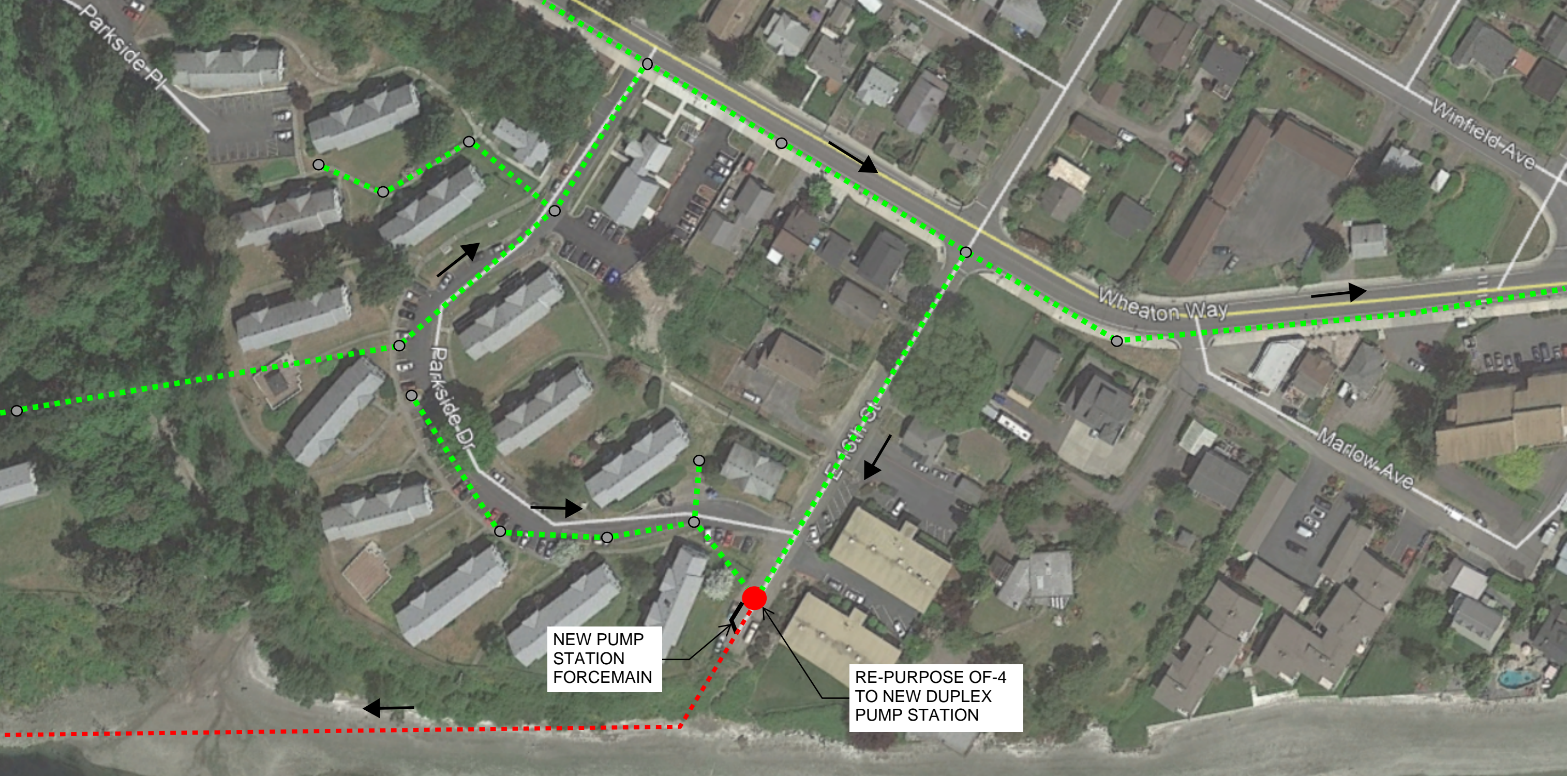
Parametrix



Not to Scale

Manette Beach Sewer Project

Figure 2 - Alternative N-2 Site Plan



| LEGEND | EXISTING | NEW |
|----------------------------|-------------|-------------|
| SS GRAVITY MAIN | <div></div> | <div></div> |
| SS GRAVITY LATERAL | <div></div> | <div></div> |
| LOW PRESSURE SEWER MAIN | <div></div> | <div></div> |
| LOW PRESSURE SEWER LATERAL | | <div></div> |
| GRINDER PUMP STATION | | <div></div> |
| OVERFLOW STRUCTURE 4 | <div></div> | |
| SS MANHOLE | <div></div> | <div></div> |

 DIRECTION OF FLOW ARROW

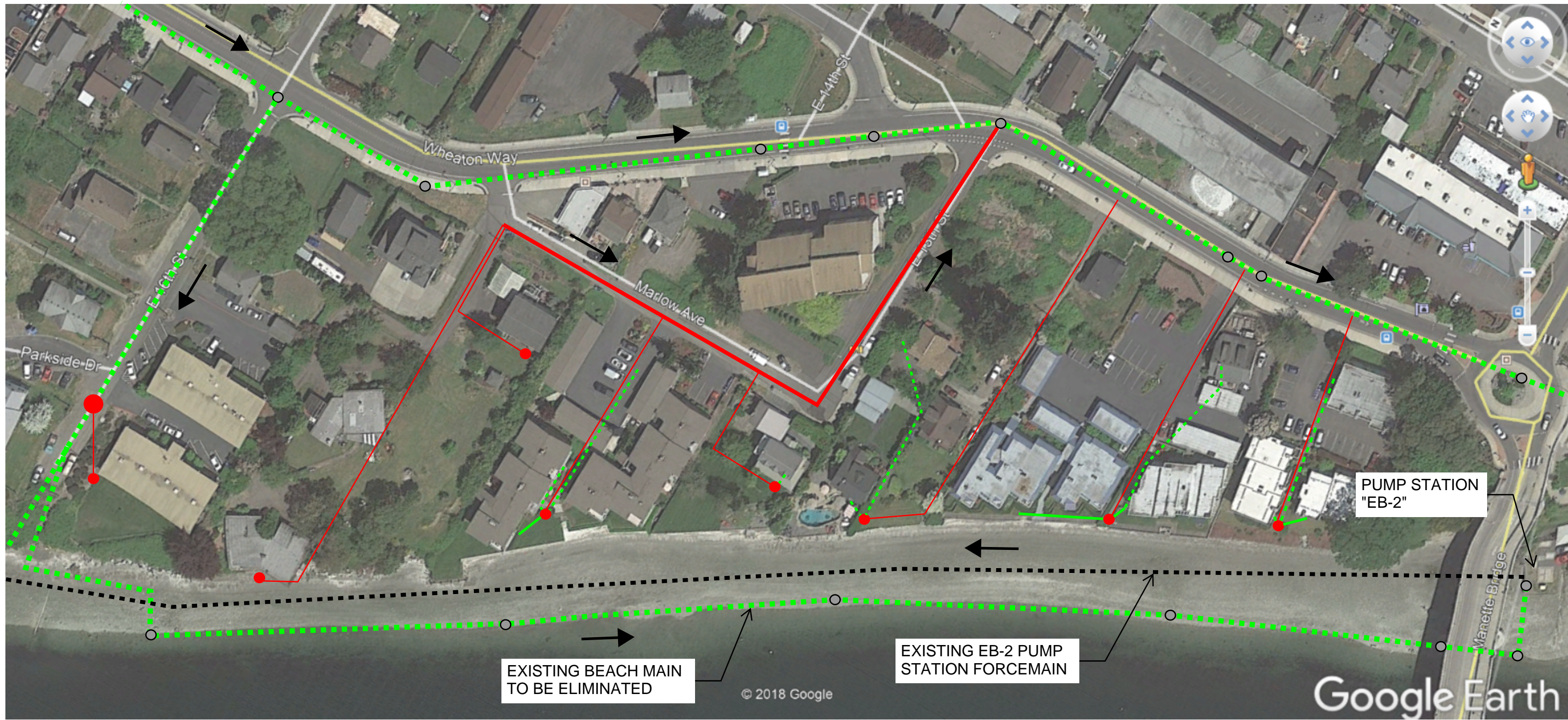
Parametrix



Not to Scale

Manette Beach Sewer Project

Figure 3 - Alternative N-3 Site Plan



LEGEND

SS GRAVITY MAIN

EXISTING



NEW



SS GRAVITY LATERAL



LOW PRESSURE SEWER MAIN



LOW PRESSURE SEWER LATERAL



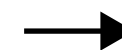
GRINDER PUMP STATION



OVERFLOW STRUCTURE 4



SS MANHOLE



DIRECTION OF FLOW ARROW

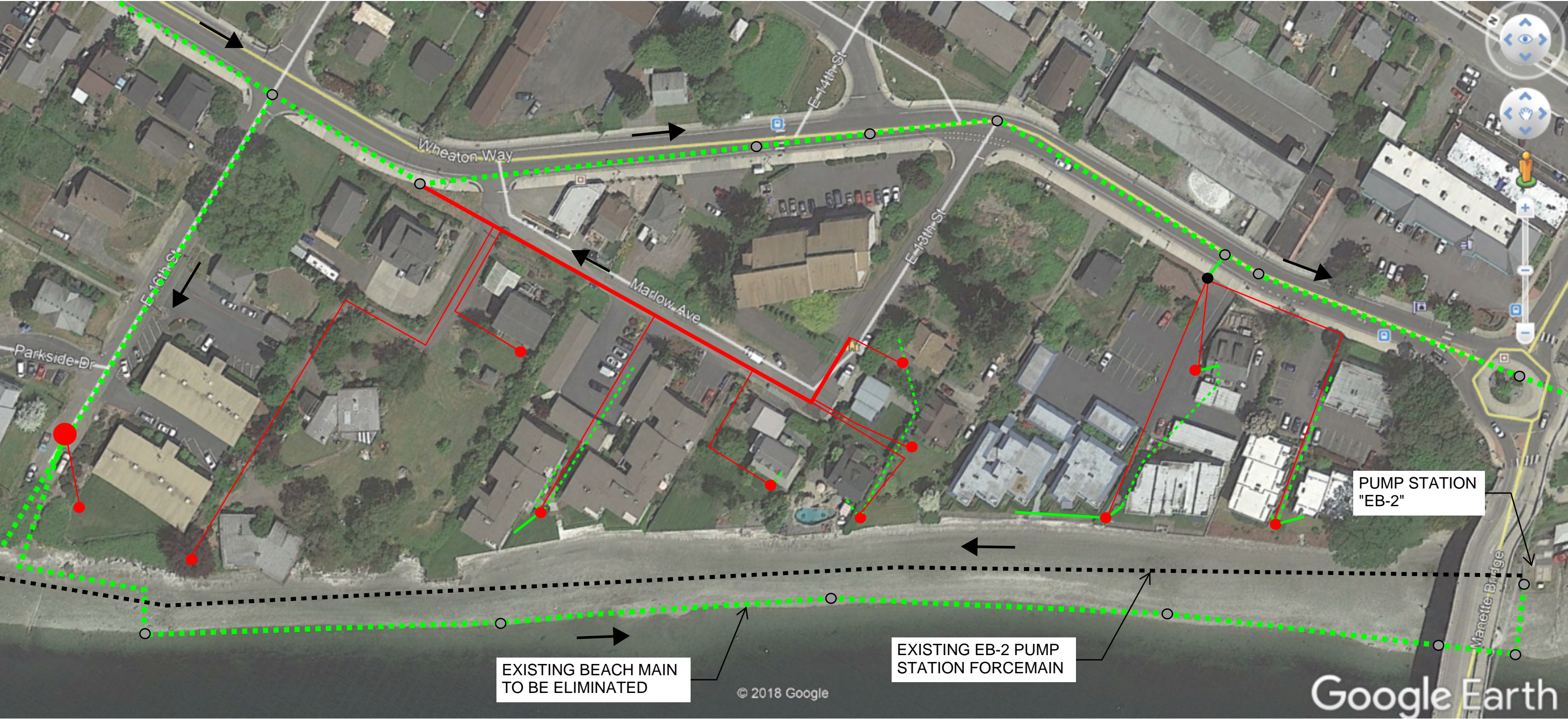
Parametrix



Not to Scale

Manette Beach Sewer Project

Figure 4 - Alternative S-1 Site Plan



LEGEND

SS GRAVITY MAIN

EXISTING

NEW



SS GRAVITY LATERAL



LOW PRESSURE SEWER MAIN



LOW PRESSURE SEWER LATERAL



GRINDER PUMP STATION



OVERFLOW STRUCTURE 4



SS MANHOLE



DIRECTION OF FLOW ARROW

Parametrix



Not to Scale

Manette Beach Sewer Project

Figure 5 - Alternative S-2 Site Plan

Appendix B

Engineer's Opinion of Probable Project Cost

Alternative N-1 Cost Opinion
Alternative N-2 Cost Opinion
Alternative N-3 Cost Opinion
Alternative S-1 Cost Opinion
Alternative S-2 Cost Opinion
Removal of Existing Beach Main Cost Opinion
Decommission-in-Place Existing Beach Main Cost Opinion

City of Bremerton
Planning-Level Engineers Opinion of Probable Project Cost
Manette Beach Sewer Project

Alternative: North of 16th Street #1 (N-1)
Prepared by: B. Moss
Checked by: C. Simmons
Estimate Class: Class 5 (0 to 2% design)
Date: 10/11/2018

| Item Number | Description | Quantity | Unit | Unit Price ¹ | Total |
|--|---|----------|------|-------------------------|-------------------|
| 1 | Mobilization ² (10%) | 1 | LS | \$ 31,710 | \$ 31,700 |
| 2 | Minor Changes ² (8%) | 1 | LS | \$ 25,368 | \$ 25,400 |
| 3 | Temporary Traffic Control | 1 | LS | \$ 10,000 | \$ 10,000 |
| 4 | Removal of Structures and Obstructions | 1 | LS | \$ 5,000 | \$ 5,000 |
| 5 | Pothole Existing Utility | 10 | EA | \$ 225 | \$ 2,300 |
| 6 | Landscape Restoration | 1 | LS | \$ 5,000 | \$ 5,000 |
| 7 | Shoring or Extra Excavation | 1 | LS | \$ 1,500 | \$ 1,500 |
| 8 | Asphalt Concrete Pavement Removal | 380 | SY | \$ 20 | \$ 7,400 |
| 9 | Cement Concrete Sidewalk and Driveway Removal | 20 | SY | \$ 14 | \$ 300 |
| 10 | Cement Concrete Curb and Gutter Removal | 30 | LF | \$ 5 | \$ 100 |
| 11 | Erosion/Water Pollution Control | 1 | LS | \$ 7,500 | \$ 7,500 |
| 12 | Cement Concrete Curb and Gutter | 30 | LF | \$ 35 | \$ 1,000 |
| 13 | Cement Concrete Sidewalk | 20 | SY | \$ 51 | \$ 1,000 |
| 14 | Asphalt Concrete Pavement Restoration | 380 | SY | \$ 50 | \$ 19,000 |
| 15 | Simplex Grinder Station | 2 | EA | \$ 6,856 | \$ 13,700 |
| 16 | Duplex Grinder Station | 7 | EA | \$ 23,770 | \$ 166,400 |
| 17 | 1-1/4" Low Pressure PVC Forcemain | 825 | LF | \$ 29 | \$ 23,900 |
| 18 | Electrical Service to New Pump Stations | 9 | EA | \$ 5,000 | \$ 45,000 |
| 19 | Misc. Valves, Piping | 1 | LS | \$ 5,000 | \$ 5,000 |
| 20 | Sewer and/or MH Connections | 2 | EA | \$ 1,500 | \$ 3,000 |
| Subtotal 1 | | | | | \$ 374,200 |
| Contingency 40% | | | | | \$ 149,700 |
| Subtotal 2 | | | | | \$ 523,900 |
| Sales Tax 9.0% | | | | | \$ 47,200 |
| Planning Level Construction Cost | | | | | \$ 571,100 |
| Administration, Legal ³ 5% | | | | | \$ 28,600 |
| Design, Permitting ³ 25% | | | | | \$ 142,800 |
| Construction Management ³ 20% | | | | | \$ 114,200 |
| PROJECT TOTAL: | | | | | \$ 856,700 |

NOTES:

¹Contractor install/overhead/profit included in Unit Price; Unit Price sources include:
Average of contractor bid prices for 2014 City sewer project, adjusted for quantity (typically +50% when significantly smaller quantity used)
Vendor equipment quote price, adjusted to include contractor install/overhead/profit (typically +25% of equipment cost)
Engineering judgement for conceptual design, Class 5 estimate as defined by the Association for the Advancement of Cost Engineering (AACE)

²Mobilization and Minor Change calculated from items 3-20, percentages typical for City projects

³Admin, Legal, Design, Permitting, and Construction Management percentages provided by City from recent projects

City of Bremerton
Planning-Level Engineers Opinion of Probable Project Cost
Manette Beach Sewer Project

Alternative: North of 16th Street #2 (N-2)
Prepared by: B. Moss
Checked by: C. Simmons
Estimate Class: Class 5 (0 to 2% design)
Date: 10/11/2018

| Item Number | Description | Quantity | Unit | Unit Price ¹ | Total |
|--|---|----------|------|-------------------------|-------------------|
| 1 | Mobilization ² (10%) | 1 | LS | \$ 32,170 | \$ 32,200 |
| 2 | Minor Changes ² (8%) | 1 | LS | \$ 25,736 | \$ 25,700 |
| 3 | Temporary Traffic Control | 1 | LS | \$ 2,000 | \$ 2,000 |
| 4 | Removal of Structures and Obstructions | 1 | LS | \$ 5,000 | \$ 5,000 |
| 5 | Pothole Existing Utility | 10 | EA | \$ 225 | \$ 2,300 |
| 6 | Landscape Restoration | 1 | LS | \$ 5,000 | \$ 5,000 |
| 7 | Shoring or Extra Excavation | 1 | LS | \$ 1,500 | \$ 1,500 |
| 8 | Asphalt Concrete Pavement Removal | 570 | SY | \$ 20 | \$ 11,100 |
| 9 | Cement Concrete Sidewalk and Driveway Removal | 20 | SY | \$ 14 | \$ 300 |
| 10 | Cement Concrete Curb and Gutter Removal | 30 | LF | \$ 5 | \$ 100 |
| 11 | Erosion/Water Pollution Control | 1 | LS | \$ 7,500 | \$ 7,500 |
| 12 | Cement Concrete Curb and Gutter | 30 | LF | \$ 35 | \$ 1,000 |
| 13 | Cement Concrete Sidewalk | 20 | SY | \$ 51 | \$ 1,000 |
| 14 | Asphalt Concrete Pavement Restoration | 570 | SY | \$ 50 | \$ 28,500 |
| 15 | Simplex Grinder Station | 2 | EA | \$ 6,856 | \$ 13,700 |
| 16 | Duplex Grinder Station | 7 | EA | \$ 23,770 | \$ 166,400 |
| 17 | 1-1/4" Low Pressure PVC Forcemain | 855 | LF | \$ 29 | \$ 24,800 |
| 18 | Electrical Service to New Pump Stations | 9 | EA | \$ 5,000 | \$ 45,000 |
| 19 | Misc. Valves, Piping | 1 | LS | \$ 5,000 | \$ 5,000 |
| 20 | Sewer and/or MH Connections | 1 | EA | \$ 1,500 | \$ 1,500 |
| Subtotal 1 | | | | | \$ 379,600 |
| Contingency 40% | | | | | \$ 151,800 |
| Subtotal 2 | | | | | \$ 531,400 |
| Sales Tax 9.0% | | | | | \$ 47,800 |
| Planning Level Construction Cost | | | | | \$ 579,200 |
| Administration, Legal ³ 5% | | | | | \$ 29,000 |
| Design, Permitting ³ 25% | | | | | \$ 144,800 |
| Construction Management ³ 20% | | | | | \$ 115,800 |
| PROJECT TOTAL: | | | | | \$ 868,800 |

NOTES:

¹Contractor install/overhead/profit included in Unit Price; Unit Price sources include:
Average of contractor bid prices for 2014 City sewer project, adjusted for quantity (typically +50% when significantly smaller quantity used)
Vendor equipment quote price, adjusted to include contractor install/overhead/profit (typically +25% of equipment cost)
Engineering judgement for conceptual design, Class 5 estimate as defined by the Association for the Advancement of Cost Engineering (AACE)

²Mobilization and Minor Change calculated from items 3-20, percentages typical for City projects

³Admin, Legal, Design, Permitting, and Construction Management percentages provided by City from recent projects

City of Bremerton
Planning-Level Engineers Opinion of Probable Project Cost
Manette Beach Sewer Project

Alternative: North of 16th Street #3 (N-3)
Prepared by: B. Moss
Checked by: C. Simmons
Estimate Class: Class 5 (0 to 2% design)
Date: 10/11/2018

| Item Number | Description | Quantity | Unit | Unit Price ¹ | Total |
|---|---|----------|------|-------------------------|-------------------|
| 1 | Mobilization ² (10%) | 1 | LS | \$ 24,490 | \$ 24,500 |
| 2 | Minor Changes ² (8%) | 1 | LS | \$ 19,592 | \$ 19,600 |
| 3 | Temporary Traffic Control | 1 | LS | \$ 1,000 | \$ 1,000 |
| 4 | Removal of Structures and Obstructions | 1 | LS | \$ 1,500 | \$ 1,500 |
| 5 | Pothole Existing Utility | 2 | EA | \$ 225 | \$ 500 |
| 6 | Landscape Restoration | 1 | LS | \$ 1,000 | \$ 1,000 |
| 7 | Shoring or Extra Excavation | 1 | LS | \$ 1,500 | \$ 1,500 |
| 8 | Asphalt Concrete Pavement Removal | 55 | SY | \$ 20 | \$ 1,100 |
| 9 | Erosion/Water Pollution Control | 1 | LS | \$ 2,500 | \$ 2,500 |
| 10 | Asphalt Concrete Pavement Restoration | 55 | SY | \$ 50 | \$ 2,800 |
| 11 | New Custom Pump Station | 1 | LS | \$ 200,000 | \$ 200,000 |
| 12 | 1-1/4" Low Pressure PVC Forcemain | 50 | LF | \$ 29 | \$ 1,500 |
| 13 | Electrical Service to New Pump Stations | 1 | EA | \$ 25,000 | \$ 25,000 |
| 14 | Misc. Valves, Piping | 1 | LS | \$ 5,000 | \$ 5,000 |
| 15 | Sewer and/or MH Connections | 1 | EA | \$ 1,500 | \$ 1,500 |
| Subtotal 1 | | | | | \$ 289,000 |
| Contingency | | | | | 40% \$ 115,600 |
| Subtotal 2 | | | | | \$ 404,600 |
| Sales Tax | | | | | 9.0% \$ 36,400 |
| Planning Level Construction Cost | | | | | \$ 441,000 |
| Administration, Legal ³ | | | | | 5% \$ 22,100 |
| Design, Permitting ³ | | | | | 25% \$ 110,300 |
| Construction Management ³ | | | | | 20% \$ 88,200 |
| PROJECT TOTAL: | | | | | \$ 661,600 |

NOTES:

¹Contractor install/overhead/profit included in Unit Price; Unit Price sources include:
Average of contractor bid prices for 2014 City sewer project, adjusted for quantity (typically +50% when significantly smaller quantity used)
Vendor equipment quote price, adjusted to include contractor install/overhead/profit (typically +25% of equipment cost)
Engineering judgement for conceptual design, Class 5 estimate as defined by the Association for the Advancement of Cost Engineering (AACE)

²Mobilization and Minor Change calculated from items 3-15, percentages typical for City projects

³Admin, Legal, Design, Permitting, and Construction Management percentages provided by City from recent projects

City of Bremerton
Planning-Level Engineers Opinion of Probable Project Cost
Manette Beach Sewer Project

Alternative: South of 16th Street #1 (S-1)
Prepared by: B. Moss
Checked by: C. Simmons
Estimate Class: Class 5 (0 to 2% design)
Date: 10/11/2018

| Item Number | Description | Quantity | Unit | Unit Price ¹ | Total |
|--|--|----------|------|-------------------------|---------------------|
| 1 | Mobilization ² (10%) | 1 | LS | \$ 39,520 | \$ 39,500 |
| 2 | Minor Changes ² (8%) | 1 | LS | \$ 31,616 | \$ 31,600 |
| 3 | Temporary Traffic Control | 1 | LS | \$ 5,000 | \$ 5,000 |
| 4 | Removal of Structures and Obstructions | 1 | LS | \$ 5,000 | \$ 5,000 |
| 5 | Pothole Existing Utility | 15 | EA | \$ 225 | \$ 3,400 |
| 6 | Landscape Restoration | 1 | LS | \$ 10,000 | \$ 10,000 |
| 7 | Shoring or Extra Excavation | 1 | LS | \$ 1,500 | \$ 1,500 |
| 8 | Asphalt Concrete Pavement Removal | 749 | SY | \$ 20 | \$ 14,600 |
| 9 | Cement Concrete Sidewalk and Driveway Removal | 28 | SY | \$ 14 | \$ 400 |
| 10 | Cement Concrete Curb and Gutter Removal | 24 | LF | \$ 5 | \$ 100 |
| 11 | Erosion/Water Pollution Control | 1 | LS | \$ 7,500 | \$ 7,500 |
| 12 | Cement Concrete Curb and Gutter | 24 | LF | \$ 35 | \$ 800 |
| 13 | Cement Concrete Sidewalk | 28 | SY | \$ 51 | \$ 1,400 |
| 14 | Asphalt Concrete Pavement Restoration | 749 | SY | \$ 50 | \$ 37,500 |
| 15 | Simplex Grinder Station | 3 | EA | \$ 6,856 | \$ 20,600 |
| 16 | Duplex Grinder Station | 1 | EA | \$ 23,770 | \$ 23,800 |
| 17 | Triplex Grinder Station | 4 | EA | \$ 28,669 | \$ 114,700 |
| 18 | 1-1/4" Low Pressure PVC Forcemain | 2,273 | LF | \$ 29 | \$ 65,900 |
| 19 | Electrical Service to New Pump Stations | 8 | EA | \$ 5,000 | \$ 40,000 |
| 20 | H-20 Rated Top for Grinder Station in Pavement | 1 | EA | \$ 15,000 | \$ 15,000 |
| 21 | Misc. Valves, Piping | 1 | LS | \$ 5,000 | \$ 5,000 |
| 22 | Sewer and/or MH Connections | 2 | EA | \$ 1,500 | \$ 3,000 |
| 23 | 6" PVC Side Sewer | 255 | LF | \$ 55 | \$ 14,000 |
| 24 | Plug/Cap Side Sewer | 12 | EA | \$ 500 | \$ 6,000 |
| Subtotal 1 | | | | | \$ 466,300 |
| Contingency 40% | | | | | \$ 186,500 |
| Subtotal 2 | | | | | \$ 652,800 |
| Sales Tax 9.0% | | | | | \$ 58,800 |
| Planning Level Construction Cost | | | | | \$ 711,600 |
| Administration, Legal ³ 5% | | | | | \$ 35,600 |
| Design, Permitting ³ 25% | | | | | \$ 177,900 |
| Construction Management ³ 20% | | | | | \$ 142,300 |
| PROJECT TOTAL: | | | | | \$ 1,067,400 |

NOTES:

¹Contractor install/overhead/profit included in Unit Price; Unit Price sources include:
Average of contractor bid prices for 2014 City sewer project, adjusted for quantity (typically +50% when significantly smaller quantity used)
Vendor equipment quote price, adjusted to include contractor install/overhead/profit (typically +25% of equipment cost)
Engineering judgement for conceptual design, Class 5 estimate as defined by the Association for the Advancement of Cost Engineering (AACE)

²Mobilization and Minor Change calculated from items 3-24, percentages typical for City projects

³Admin, Legal, Design, Permitting, and Construction Management percentages provided by City from recent projects

City of Bremerton
Planning-Level Engineers Opinion of Probable Project Cost
Manette Beach Sewer Project

Alternative: South of 16th Street #2 (S-2)
Prepared by: B. Moss
Checked by: C. Simmons
Estimate Class: Class 5 (0 to 2% design)
Date: 10/11/2018

| Item Number | Description | Quantity | Unit | Unit Price ¹ | Total |
|--|--|----------|------|-------------------------|---------------------|
| 1 | Mobilization ² (10%) | 1 | LS | \$ 42,060 | \$ 42,100 |
| 2 | Minor Changes ² (8%) | 1 | LS | \$ 33,648 | \$ 33,600 |
| 3 | Temporary Traffic Control | 1 | LS | \$ 5,000 | \$ 5,000 |
| 4 | Removal of Structures and Obstructions | 1 | LS | \$ 5,000 | \$ 5,000 |
| 5 | Pothole Existing Utility | 15 | EA | \$ 225 | \$ 3,400 |
| 6 | Landscape Restoration | 1 | LS | \$ 10,000 | \$ 10,000 |
| 7 | Shoring or Extra Excavation | 1 | LS | \$ 1,500 | \$ 1,500 |
| 8 | Asphalt Concrete Pavement Removal | 780 | SY | \$ 20 | \$ 15,200 |
| 9 | Cement Concrete Sidewalk and Driveway Removal | 101 | SY | \$ 14 | \$ 1,400 |
| 10 | Cement Concrete Curb and Gutter Removal | 152 | LF | \$ 5 | \$ 700 |
| 11 | Erosion/Water Pollution Control | 1 | LS | \$ 7,500 | \$ 7,500 |
| 12 | Cement Concrete Curb and Gutter | 152 | LF | \$ 35 | \$ 5,200 |
| 13 | Cement Concrete Sidewalk | 101 | SY | \$ 51 | \$ 5,200 |
| 14 | Asphalt Concrete Pavement Restoration | 780 | SY | \$ 50 | \$ 39,000 |
| 15 | Simplex Grinder Station | 7 | EA | \$ 6,856 | \$ 48,000 |
| 16 | Duplex Grinder Station | 1 | EA | \$ 23,770 | \$ 23,800 |
| 17 | Triplex Grinder Station | 3 | EA | \$ 28,669 | \$ 86,000 |
| 18 | Custom H-20 top for Grinder Station in Parking Lot | 1 | EA | \$ 10,000 | \$ 10,000 |
| 19 | 1-1/4" Low Pressure PVC Forcemain | 2,241 | LF | \$ 29 | \$ 65,000 |
| 20 | Electrical Service to New Pump Stations | 11 | EA | \$ 5,000 | \$ 55,000 |
| 21 | H-20 Rated Top for Grinder Station in Pavement | 1 | EA | \$ 15,000 | \$ 15,000 |
| 22 | Misc. Valves, Piping | 1 | LS | \$ 5,000 | \$ 5,000 |
| 23 | Sewer and/or MH Connections | 2 | EA | \$ 1,500 | \$ 3,000 |
| 24 | 6" PVC Side Sewer | 25 | LF | \$ 55 | \$ 1,400 |
| 25 | 48" MH | 1 | EA | \$ 3,300 | \$ 3,300 |
| 26 | Plug/Cap Side Sewer | 12 | EA | \$ 500 | \$ 6,000 |
| Subtotal 1 | | | | | \$ 496,300 |
| Contingency 40% | | | | | \$ 198,500 |
| Subtotal 2 | | | | | \$ 694,800 |
| Sales Tax 9.0% | | | | | \$ 62,500 |
| Planning Level Construction Cost | | | | | \$ 757,300 |
| Administration, Legal ³ 5% | | | | | \$ 37,900 |
| Design, Permitting ³ 25% | | | | | \$ 189,300 |
| Construction Management ³ 20% | | | | | \$ 151,500 |
| PROJECT TOTAL: | | | | | \$ 1,136,000 |

NOTES:

¹Contractor install/overhead/profit included in Unit Price; Unit Price sources include:

Average of contractor bid prices for 2014 City sewer project, adjusted for quantity (typically +50% when significantly smaller quantity used)

Vendor equipment quote price, adjusted to include contractor install/overhead/profit (typically +25% of equipment cost)

Engineering judgement for conceptual design, Class 5 estimate as defined by the Association for the Advancement of Cost Engineering (AACE)

²Mobilization and Minor Change calculated from items 3-26, percentages typical for City projects

³Admin, Legal, Design, Permitting, and Construction Management percentages provided by City from recent projects

City of Bremerton
Planning-Level Engineers Opinion of Probable Project Cost
Manette Beach Sewer Project

Alternative: Decommission-in-Place Existing Beach Main
Prepared by: B. Moss
Checked by: C. Simmons
Estimate Class: Class 5 (0 to 2% design)
Date: 10/11/2018

| Item Number | Description | Quantity | Unit | Unit Price ¹ | Total |
|---|-----------------------------------|----------|------|-------------------------|-------------------|
| 1 | Mobilization ² (10%) | 1 | LS | \$ 6,620 | \$ 6,600 |
| 2 | Minor Changes ^{2,3} (8%) | 0 | LS | \$ - | \$ - |
| 3 | 8" CI Sewer Decommission | 4 | DAY | \$ 7,200 | \$ 28,800 |
| 4 | Concrete Cap FM at MH | 2 | EA | \$ 2,500 | \$ 5,000 |
| 5 | Fill MH w/ Sand/Gravel | 16 | CY | \$ 150 | \$ 2,400 |
| 6 | Removal of MH lids/tops | 5 | EA | \$ 2,000 | \$ 10,000 |
| 7 | Erosion/Water Pollution Control | 1 | LS | \$ 20,000 | \$ 20,000 |
| Subtotal 1 | | | | | \$ 72,800 |
| Contingency 40% | | | | | \$ 29,100 |
| Subtotal 2 | | | | | \$ 101,900 |
| Sales Tax 9.0% | | | | | \$ 9,200 |
| Planning Level Construction Cost | | | | | \$ 111,100 |
| Administration, Legal ³ 0% | | | | | \$ - |
| Design, Permitting ³ 0% | | | | | \$ - |
| Construction Management ³ 0% | | | | | \$ - |
| PROJECT TOTAL: | | | | | \$ 111,100 |

NOTES:

¹Contractor install/overhead/profit included in Unit Price; Unit Price sources include:
Sewer removal based on 2014 Beach Sewer Main Decommission Evaluation Report by City for WA DNR; cost inflated per
ENR CCI from 2014 to 2018
Engineering judgement for conceptual design, Class 5 estimate as defined by the Association for the Advancement of Cost
Engineering (AACE)

²Mobilization and Minor Change calculated from items 3-7, percentages typical for City projects

³Minor Change, Administration, Legal, Design, Permitting, and Construction Management included in "N" and "S" alternatives

City of Bremerton
Planning-Level Engineers Opinion of Probable Project Cost
Manette Beach Sewer Project

Alternative: Removal of Existing Beach Main
Prepared by: B. Moss
Checked by: C. Simmons
Estimate Class: Class 5 (0 to 2% design)
Date: 10/11/2018

| Item Number | Description | Quantity | Unit | Unit Price ¹ | Total |
|---|-----------------------------------|----------|------|-------------------------|-------------------|
| 1 | Mobilization ² (10%) | 1 | LS | \$ 31,310 | \$ 31,300 |
| 2 | Minor Changes ^{2,3} (8%) | 0 | LS | \$ - | \$ - |
| 3 | 8" CI Sewer Removal | 24 | DAY | \$ 7,200 | \$ 172,800 |
| 4 | Lateral Removal | 10 | DAY | \$ 7,200 | \$ 72,000 |
| 5 | CI Pipe Disposal | 21 | TON | \$ 110 | \$ 2,300 |
| 6 | MH Removal | 5 | DAY | \$ 7,200 | \$ 36,000 |
| 7 | MH Disposal | 5 | EA | \$ 1,000 | \$ 5,000 |
| 8 | Erosion/Water Pollution Control | 1 | LS | \$ 20,000 | \$ 20,000 |
| 9 | Plug/Cap 8" Sanitary Sewer | 2 | EA | \$ 2,500 | \$ 5,000 |
| Subtotal 1 | | | | | \$ 344,400 |
| Contingency 40% | | | | | \$ 137,800 |
| Subtotal 2 | | | | | \$ 482,200 |
| Sales Tax 9.0% | | | | | \$ 43,400 |
| Planning Level Construction Cost | | | | | \$ 525,600 |
| Administration, Legal ³ 0% | | | | | \$ - |
| Design, Permitting ³ 0% | | | | | \$ - |
| Construction Management ³ 0% | | | | | \$ - |
| PROJECT TOTAL: | | | | | \$ 525,600 |

NOTES:

¹Contractor install/overhead/profit included in Unit Price; Unit Price sources include:
Sewer removal based on 2014 Beach Sewer Main Decommission Evaluation Report by City for WA DNR; cost inflated per ENR CCI from 2014 to 2018
Engineering judgement for conceptual design, Class 5 estimate as defined by the Association for the Advancement of Cost Engineering (AACE)

²Mobilization and Minor Change calculated from items 3-9, percentages typical for City projects

³Minor Change, Administration, Legal, Design, Permitting, and Construction Management included in "N" and "S" alternatives